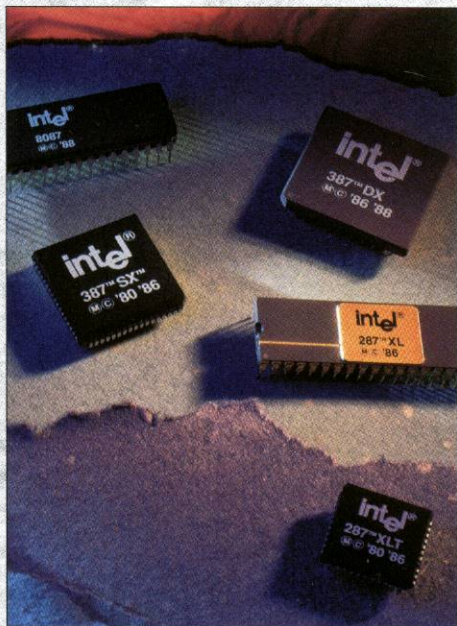intel

Intel Math CoProcessors
Pocket Information Guide

Intel Math CoProcessors—
—a quick overview

As most computer users know, a PC's brain is its microprocessor—the computer inside the computer. What they might not know is that another chip, called a math coprocessor, can work right along with their existing microprocessor to deliver even faster system performance.

An Intel Math CoProcessor speeds up certain computations so that spreadsheets, business graphics, accounting, scientific and engineering, database, and CAD programs all run up to five times faster. As a result, your customers become more productive than ever.

If your customers think that only scientists, engineers, and programmers need the extra speed of math coprocessors, they're in for a pleasant surprise. Because the Intel Math CoProcessor can be an enormous help to business users, too.

intel® i387™

Key features of Intel Math CoProcessors.

A proven solution. Intel Math CoProcessors are the industry standard, with millions of satisfied users worldwide.

100% Intel compatibility. Intel Math CoProcessors are specifically designed to work with the Intel microprocessors already inside customers' PCs.

Quality you can rely on. The Intel Math CoProcessor is manufactured to the highest standards and is backed with a 5-year warranty.

The choice of software developers. Intel Math CoProcessors are the first choice of more than 600 software developers and over 2,100 applications.

Key selling points.

- *Easy installation.*
- *Operates in any system that contains an Intel Math CoProcessor socket.*
- *Runs all software—application and diagnostic.*
- *Runs under all operating systems: DOS**, OS/2**, UNIX**, Xenix**, Windows**, Desqview**.*
- *Conforms to the IEEE 754 1985 floating point standard.*
- *Returns identical results for the same data every single time.*
- *The proven solution for millions of users.*
- *Intel quality—manufactured to the highest standards.*
- *5-year warranty.*
- *The first choice of software developers.*
- *Improves performance on over 2,100 software applications.*

The history of the math coprocessor.

Intel created the first math chip in 1980—the 8087. Since then, we've introduced a math coprocessor for each of our microprocessors. To date, we've shipped millions of math coprocessors to satisfied users everywhere.

We designed the Intel Math CoProcessor to work perfectly with the Intel microprocessor already in your customers' PCs. This assures them of 100% compatibility.

It's important to note that Intel Math CoProcessors are fabricated, assembled, and tested with the same state-of-the-art technology that goes into our microprocessors.

We created the industry standard.

We're proud of the fact that Intel played a major role in developing the IEEE 754 1985 floating point standard that all math coprocessors must adhere to.

Intel Math CoProcessors run on every common operating system in use today—DOS, Windows, Desqview, OS/2, UNIX, and Xenix.

Each of these operating systems—and a large family of popular software applications—were designed with Intel products as the foundation. So your customers are assured that the software they buy tomorrow will be compatible with the hardware they buy today.

A closer look at Intel Math CoProcessors.

Intel Math CoProcessors boost the performance of your customers' computers and dramatically raise productivity.

Here's an overview of how these powerful chips work:

The microprocessor in your customers' computer (the Intel 8086, 8088, 80286, 80386 SX, 80386 DX, or 80486 SX) was designed to do basic integer arithmetic, including addition, subtraction, multiplication and division of whole numbers.

However, mathematical operations involving very large numbers, floating point numbers (ones that include fractions), or more complex calculations can significantly slow down a user's microprocessor. This means it takes longer for the computer to calculate a spreadsheet, draw a graph, or complete a CAD drawing.

As software programs become more complex, they get larger, more cumbersome and slower. So they can benefit from the extra computing power Intel Math CoProcessors provide. Even if an application doesn't appear to be math intensive, it may be using math "behind the scenes" to do its work.

For example, graphics and font generation, spreadsheet calculations and even creating charts all involve mathematical operations. Vector-oriented graphics use formulas to represent what the user draws or writes. For instance, if the user changes the size or location of a circle, the software must change its formula and perform a recalculation.

The Intel Math CoProcessor makes these recalculations faster, speeding up changes and other redraws. The result is higher performance and greater productivity for your customers.

How the microprocessor and Intel Math CoProcessor work as a team.

The microprocessor handles complex mathematical operations by using software subroutines built from hundreds of its basic arithmetic functions.

Depending on the complexity of the operation, one of these subroutines can take hundreds of times longer than a standard microprocessor instruction. This places a substantial load on the microprocessor and results in longer "wait" times for users.

The Intel Math CoProcessor off-loads math-intensive operations from the microprocessor, handling in one instruction what would take hundreds of instructions on a general purpose microprocessor.

How to match the right Intel Math CoProcessor with the right CPU.

Compatibility is one of the most important issues confronting computer users today. After making a substantial investment in technology, your customers want all their hardware and software to work together for maximum productivity.

With a genuine Intel Math CoProcessor in their personal computer, they'll never have to worry about compatibility.

Here's a convenient guide that shows you which Intel Math CoProcessor goes with which Intel microprocessor.

Intel Microprocessor	Intel Math CoProcessor
4.77 MHz 8088 or 8086	8087 (-3)
8 MHz 8088 or 8086	8087-2
10 MHz 8088 or 8086	8087-1
any 80286	80287 XL*
16 MHz 80386 SX	80387 SX-16
20 MHz 80386 SX	80387 SX-20
16 MHz 80386 DX	80387 DX-16
20 MHz 80386 DX	80387 DX-25
25 MHz 80386 DX	80387 DX-25
33 MHz 80386 DX	80387 DX-33
20 MHz 80486 SX	80487 SX-20
i486™ cpu	built into i486

*Note: a few specially-designed laptops such as the Compaq LTE/286** and Tandy 2800** use the Intel 80287 XLT.*

Which applications can benefit from an Intel Math CoProcessor?

The Intel Math CoProcessor was designed to speed up application software. In fact, it boosts the performance of more than 2,100 software packages—up to 500%. That makes the Intel Math CoProcessor one of the most popular personal computer enhancement products on the market.

Evaluating system performance.

Math coprocessor performance is generally measured with industry standard comparative tests, or benchmarks. There are two basic categories—floating point benchmarks and application software benchmarks.

Application software benchmarks emulate the user environment in range and complexity—from a single job or task to an entire user workload. These benchmarks measure the real-world results users want, by evaluating performance of actual application software like Lotus 1-2-3** and AutoCAD**.

On the other hand, floating point benchmarks depend upon the program instructions created by their author. These benchmarks consist of a series of math-intensive instructions and do not attempt to duplicate the environment the user actually works in.

Application software benchmarks. The smart way to measure performance.

As you can see, application software benchmarks are the best way to evaluate the kind of performance a user can expect. These tests answer meaningful questions like, "How fast will Lotus-1-2-3 recalculate my spreadsheet? or "How long will AutoCAD take to redraw this design?"

The Intel Math CoProcessor in action.

We've compared software performance with and without an Intel Math CoProcessor. Tests were conducted on a 16 MHz system with the Intel387™ SX-16 Math CoProcessor.

The software: **Lotus 1-2-3 Release 3**
Test condition: A mortgage payment schedule.
The results:

With the Intel Math CoProcessor... 10 seconds
Without...   33 seconds

The software: **Lotus Freelance Plus**
Test Condition: A redraw from a definition of 4 pie charts with 16 sections each.
The results:

With the Intel Math CoProcessor... 13.5 seconds
Without...   18 seconds

The software: **AutoCAD**
The results: AutoCAD is so math intensive this powerful program actually *requires* an Intel Math CoProcessor. AutoCAD can then speed through many tough calculations.

The software: **Microsoft Excel**
Test condition: A trigonometric function using the @tan. @cos. and @sin. formulas.
The results:

With the Intel Math CoProcessor... 41 seconds
Without...   67 seconds

The bottom line?

Users who want a reliable guide to the kind of performance they can expect from their own PC should pay particularly close attention to application software benchmarks. Consult your handy Intel Product Guide for additional benchmark examples.

Installation is a snap.

Installing Intel Math CoProcessors is never an issue. Virtually all IBM** and compatible PCs feature a socket specifically designed for an Intel Math CoProcessor. And all Intel Math CoProcessors come complete with an easy-to-follow installation guide

The Intel advantage.

Intel is committed to providing users with the finest products and the best service and support available.

Every year we invest millions of dollars in research and development to bring users the latest technology and the highest quality products. For example, we recently introduced the Intel487™ SX Math CoProcessor, offering users a total solution for Intel486™SX microprocessor-based PCs. The Intel487 SX Math CoProcessor is an integral member of the Intel Math CoProcessor family.

Intel Math CoProcessors are manufactured with the same fabrication, assembly and test facilities used to manufacture Intel386™ and Intel486 microprocessors.

We've shipped millions of math coprocessors since we invented them over a decade ago. This commitment assures users of a proven and reliable manufacturing source today and tomorrow. And Intel is dedicated to continually improve and upgrade all our product families.

We also back our products with this kind of great support:

- International support: (503) 629-7354
- FAX support: (800) 458-6231
- Intel Bulletin Board Services: (503) 645-6275
- FaxBACK™ Info Service: (800) 525-3019
- Intel CompuServe Forum: "GO INTEL"
- MCI Mail Intel Support
- For technical support on Intel Math CoProcessors, call toll-free: 1-800-321-4044
- For more information on all Intel personal computer enhancement products, call toll-free: 1-800-538-3373

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